

# 1-2 Types of Functions

In the previous section you learned that you can describe functions algebraically, numerically, graphically, or verbally. A function defined by an algebraic equation often has a descriptive name. For instance, the function  $y = -x^2 + 5x + 3$  is called *quadratic*, from the latin word *quadratum*, meaning square, because the function is a polynomial whose highest power of  $x$  is  $x$  squared and *quadrangle* is one term for a square. In this section you will refresh your memory about verbal names for algebraically defined functions and see what their graphs look like.

## Objective

Make connections among the algebraic equation for a function, its name, and its graph.

## Definition of Function

If you plot the function  $y = -x^2 + 5x + 3$ , you get a graph that rises and then falls, as shown in Figure 1-2a. For any  $x$ -value you pick, there is only *one*  $y$ -value. This is not the case for all graphs. For example, in Figure 1-2b there are places where the graph has more than one  $y$ -value for the same  $x$ -value. Although the two variables are related, the relation is not a function.

A function

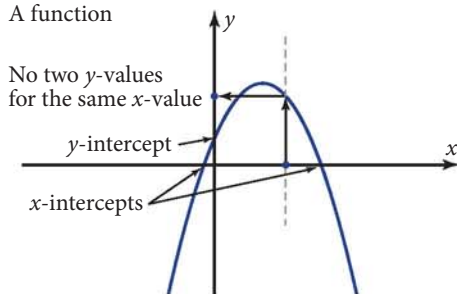


Figure 1-2a

Not a function

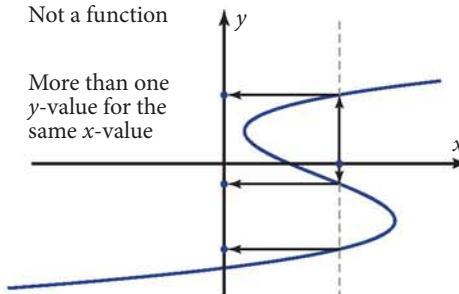


Figure 1-2b

Each point on a graph corresponds to an *ordered pair* of numbers,  $(x, y)$ . A **relation** is any set of ordered pairs. A **function** is a set of ordered pairs for which each value of the independent variable (often  $x$ ) in the domain has only *one* corresponding value of the dependent variable (often  $y$ ) in the range. So Figures 1-2a and 1-2b are both graphs of relations, but only Figure 1-2a is the graph of a function.

The **y-intercept** of a function is the value of  $y$  when  $x = 0$ . It gives the place where the graph crosses the  $y$ -axis (Figure 1-2a). An **x-intercept** is a value of  $x$  for which  $y = 0$ . Functions can have more than one  $x$ -intercept.

## $f(x)$ Terminology

You should recall  $f(x)$  notation from previous courses. It is used for  $y$ , the dependent variable of a function. With it, you show what value you substitute